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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/818,906	03/28/2001	Keiichiro Wakamiya	50090-290	2402

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EXAMINER
PAREKH, NITIN

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 01/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/818,906	Wakamlya et al
Examiner	**Art Unit**
Nitin Par kh	2811

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on Mar 28, 2001

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-13 is/are pending in the applica

4a) Of the above, claim(s) _____ is/are withdrawn from considera

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1-13 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirem

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☒ All b) ☐ Some* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 4

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, lines 9-12 cite: "a plurality of layers formed of same material and at least one of the layers is formed as a stress absorbing layer having lower hardness than the other layer".

The above statement citing a plurality of conducting layers being of the same material but having different hardness is contradictory.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (APA) in view of Ohtsuka et al (US Pat. 5952718) and Omoya et al (US Pat. 5641996).

Regarding claim 1, the APA discloses a semiconductor device comprising:

- a semiconductor chip (1 in Fig. 3)

- a protective insulating layers covering the surface of the chip (3/7/5 in Fig. 3) , and

- a connecting conductor/post (4 in Fig. 3) connected to the surface of the chip and penetrating the protective insulating layer to the outside surface of the insulating layers

(Fig. 3; specification- pp. 1 and 2).

The APA fails to specify using the connecting conductor formed of a plurality of layers formed of different material where at least one of the layers is a stress absorbing layer having lower hardness than the other layer.

Ohtsuka et al teach using a connecting conductor formed of a plurality of layers (35/36/38 in Fig. 3 and 5a-c) which are of different material such as nickel, gold, palladium, indium, etc (Col. 5, line 15- Col. 6, line 10) where at least one of the layers is made of stress absorbing material such as gold having lower hardness than the other layer such as nickel (Col. 5, line 50; Col. 6, line 10).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the connecting conductor made of a plurality of layers formed of different material where at least one of the layers is a stress absorbing layer having lower hardness than the other layer to reduce the mechanical stress and improve reliability of interconnection using Ohtsuka et al's electrode structure in the APA.

Regarding claims 2 and 3, the APA fails to specify using the connecting conductor formed of an anisotropic conductive material containing metal particles.

Omoya et al teach using conventional anisotropic conductive adhesive material containing metal particles (13 in Fig. 11) for electrode interconnection (Col. 2, line 1-13).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to use the connecting conductor formed of an anisotropic conductive material containing metal particles to reduce the mechanical stress for the interconnection using Omoya et al and Ohtsuka et al's electrode structure in the APA.

5. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (APA) in view of Ohtsuka et al (US Pat. 5952718) and Omoya et al (US Pat. 5641996) and further in view of Matsumoto et al (US Pat. 5866920).

Regarding claim 4-6, as explained above, the APA in view of Ohtsuka et al and Omoya et al teach using a connecting conductor formed of a plurality of layers fails to specify forming a plurality of conducting layers by means of stacking in a staggered manner and the layers being of substantially identical or different diameter.

Matsumoto et al teach forming a conventional multilayered structure comprising connecting conductors including wiring conductors and electrode plugs (51/52, 61/62, etc. in Fig. 3) where the plurality of conducting layers are stacked in a staggered manner (Fig. 3 and 7; Col. 1, line 30). Matsumoto et al further teach forming the plurality of conducting layers of substantially identical diameter/dimension (Fig. 3).

Furhtemore, it is a matter of design choice to select the dimension such as wiring length, diameter, spacing, thickness, etc. in chip packaging and interconnection technology art to achieve the desired bonding strength and electrical performance.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to form a plurality of conducting layers by means of stacking in a staggered manner and the layers being of substantially identical or different diameter to reduce the mechanical stress and improve the bonding strength of the interconnection using Matsumoto et al's structure in the APA in view of Omoya et al and Ohtsuka et al.

6. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (APA) in view of Ohtsuka et al (US Pat. 5952718) and Omoya et al (US Pat. 5641996).

The combined teachings of the APA, Ohtsuka et al and Omoya et al apply to claims 7 and 8 as explained above for claim 1.

7. Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (APA) in view of Ohtsuka et al (US Pat. 5952718) and Omoya et al (US Pat. 5641996) and further in view of Matsumoto et al (US Pat. 5866920).

The combined teachings of the APA, Ohtsuka et al, Omoya et al and Matsumoto et al apply to claims 9-13 as explained above for claims 1;2- 6.

Papers related to this application may be submitted directly to Art Unit 2811 by facsimile transmission. Papers should be faxed to Art Unit via Technology Center 2800 fax center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number in (703) 305-3410. The examiner can be normally reached on Monday-Friday from 08:30 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas, can be reached on (703) 308-2772. The fax number for the organization where this application or proceeding is assigned is (703) 308-7722 or 7724.

Nitin Parekh

12-30-01

Tom Thomas

TOM THOMAS
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